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A SPECIAL INVESTIGATIVE REPORT

HELP FOR TODAY'S HI-TECHNICIANS:

ENGINE ANALYZERS THAT THINK

By Robert Sikorsky

PHOTO SAL DIMARCO JR

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Bob Sikorsky, who is based in Tucson, Ariz., is an automotive consultant to government and private industry. An active member of the Society of Automotive Engineers, Sikorsky is also a best-selling author. His books include How to Get More Miles per Gallon *(St. Martin's Press, 1978), possibly the all-time best-selling automotive how-to book, with more than half a million sold;* Drive It Forever *(McGraw-Hill Book Co., 1983), now in its 13th printing; and* Break It In Right *(Avon, 1984). A new, expanded edition of* Drive It Forever *is being published by McGraw-Hill in the spring of 1988.*

Sikorsky is a recent triple award-winner at the MOTO Awards and Automotive Journalism Conference held this past December in Las Vegas. The awards, which are given for outstanding achievement in automotive journalism, were for his syndicated columns, Drive It Forever *and* Ridin' In Style. *This acknowledged car expert also received a MOTO Award in 1984 for his 1981 booklet on the efficient use of gasoline,* Ease the Squeeze, *one of the most popular booklets ever issued by the Arizona Department of Energy.*

Sikorsky's latest awards follow closely on the heels of another honor. When the editors at Reader's Digest *sought an auto expert to travel 10,000 miles, through 33 states, over a two-month period for a special investigative report on auto repair services, they selected Sikorsky. His article,* Highway Robbery: The Scandal of Auto Repair in America, *appears in the May '87 issue of* Reader's Digest.

Sikorsky, who has made hundreds of appearances on nationwide and local radio and TV shows and lectures frequently across the country, will soon be appearing in his own weekly TV car show, All Things Automotive. *The program, which is to air on KGUN, the ABC-TV affiliate in Tucson, will cover a range of automotive concerns–from how to keep your car in top shape to the effects of automobiles on the environment.*

From 1978 to 1979, Sikorsky, who is a member of the Tucson / Pima County Metropolitan Energy Commission, helped launch the U.S. Department of Energy's DECAT (Driver Energy Conservation Awareness Training) Program, whose goal is automotive fuel conservation for government and private industry. Since its inception, DECAT has become one of the DOE's most successful programs, and is now being used in all 50 states.

Sikorsky was born in Pittsburgh, Pa., on July 1, 1936. He received a B.S. degree in 1966 from the University of Arizona in Tucson. He lives in Tucson with his wife Rogga and their son Kyle.

His two weekly newspaper columns, Ridin' In Style, *a test-drive column which includes comments from his wife and son, and* Drive It Forever, *a car-maintenance column, attract 14 million readers each week. Both columns are distributed by the New York Times Syndication Sales Corp.*

Engine analyzers have been around in various forms for some time and the advent of sophisticated computers has greatly increased their potential for helping a mechanic ferret out hidden problems in various engine systems. But just how good are the new generation of engine analyzers? Can they really make a difference in the shop? Can they overcome or at least lessen the diagnostic challenges which are growing in number and formidability as cars become more complex? Are all analyzers pretty much alike? After his sensational nationwide survey trip report *Highway Robbery: The Scandal of Auto Repair in America*, appeared in the *Reader's Digest*, syndicated automotive writer Robert Sikorsky was asked by the Allen Group—a major manufacturer of analyzers—to thoroughly examine and use their computer engine analyzers. Allen paid him a consulting fee, but emphasized it wanted a no-holds-barred examination, "letting the chips fall where they may." After visiting Allen's test labs, testing competitive brands, examining other comparative tests of engine analyzers and doing some of his own testing in actual repair shops, here is Bob's report.

At a large repair facility in Pensacola, Florida I paid $35 for a computer engine analysis of my 1984 Oldsmobile. I watched as the impressive-looking machine went through its routine. After a half-hour or so, the analyzer produced a printout. Under "Secondary Ignition" it read:

"Spark plug snap KV high. Check spark plug—distributor cap terminal—plug wire—cylinder: 1, 6, 4, 3, 2."

"Abnormal Spark plug snap KV. Check spark plug condition for fouled problem cylinder: 5"

Under "Fuel System:"

"Adjust idle speed. Mixture lean at cruise. Check carburetor enrichment system—fuel injection—vacuum leak—EGR. Mixture lean at idle. Check mixture adjustment—vacuum leak—injection system or carburetor. Fuel diagnostic may be affected by secondary ignition problem."

Under "Cylinder Power:"

"Power output low. Check spark plug—wire—cap—rotor cylinder: 1 3 2. Power output low in firing order.

Check spark plug-wire-cap-rotor-crossed wires 5 4. Power output results may be affected by lean fuel mixture. Check mixture adjustment—vacuum leak."

I knew the car only had one problem—a loose spark plug wire. Why was the computer indicating other faults?

Had I heeded the analyzer's (and thus, the mechanic's) suggestions, the simple correction could have become an expensive and unnecessary parts and labor bill.

Not long after I was contacted by the Allen Group, manufacturers of the Allen "Smart" line of engine test equipment, I reviewed the records I kept on my 10,000 mile, 2 month nationwide trek to more than 225 repair shops to see if they could find a loose spark wire. The results weren't encouraging: only 44% of the shops gave me a satisfactory repair; 56% either didn't find the problem or tried to sell me a variety of unneeded repairs or parts. In those shops which had used an engine analyzer, Allen machines stood out: Each had pinpointed the problem. This "Allen anomaly" surprised and intrigued me.

Why didn't every analyzer find the loose plug wire, and why did some, such as the one in Pensacola, recommend unneeded repairs? Surely it was an easy "find" for any scope. The answer was hidden somewhere: Incompetent, inexperienced, or dishonest mechanics; unfamiliarity with or difficulty operating the analyzers or interpreting their results, or—importantly—incorrect, vague, or misleading diagnosis by the machines themselves.

Just How Smart Are They? When Allen invited my unbiased opinion of Allen and its products, I had just finished a consulting job for Oil Express, a Chicago quick-lube operation, and owner Art Lukowski offered me his 1987 Cadillac to drive to the Allen Test Products Division in Kalamazoo. I figured I would surprise Allen, offering it and my brother's 1986 GMC van (he was driving down from Detroit) as test beds.

For four days, Frank Newton, diagnostic applications engineer and Allen's Technical Service Manager, Jeff Dircks, Vice President–Research Engineering and Quality Control, and Jim VanLent, Allen's Chief Engineer were my constant companions and tutors. Frank and Jeff familiarized me with the Allen Smart Engine Analyzer (SEA), its Four-Gas Analyzer and the brand new Allen Smart Connection (ASC). They had me running tests on my own after a few hours. I listened to what everyone had to say, but in the end, it was the analyzers which had to prove themselves.

I found the simplicity and easy learnability of the SEA striking. It is truly "user friendly," taking the operator by the hand and leading him step by step through each engine system test. Anyone with a basic knowledge of cars should be able to quickly learn to operate what at first glance seems a bewildering and complex machine.

The screen is easy to read and instructions are clear and easy to follow. One after another, systems tests click off methodically. Follow instructions and it's hard to go wrong. To do an engine analysis or enter data, the operator points a photo-cell light pen at designated CRT screen areas. Touch a command or question block and the SEA responds. It also works with a remote hand-held lead the operator can carry with him as he moves around the car.

You can enter specific symptoms prior to testing or simply run a complete diagnosis without symptom identification. If symptoms are entered, the computer looks even closer at those areas.

If a complete systems test is desired, the cranking, charging, ignition primary, timing, and ignition secondary systems, and cylinder power and fuel systems are checked. Or any individual system can be tested separately. That saves time, you don't have to run all the tests just to get the results of one. For every portion of each test the screen notes the page and section in the operator's manual that the technician can refer to for a detailed explanation of the current operation.

The Smart Engine Analyzer goes through basically the same routine for each vehicle, but customizes its diagnostics of individual systems depending on what it finds wrong or right with that system. If an alternator light comes on, the unit tries to pinpoint the alternator problem (Diode, field connection, etc.) rather than just generally citing the alternator itself. The SEA is capable of over 500 problem-solving diagnostic decisions.

Time and time again I observed the SEA isolate specific problems: a fouled plug, a manifold leak, a rich fuel mixture, a faulty EGR; a crushed wire in the ECM circuit, a loose alternator drive belt. The SEA found each bug I put into a variety of engines on GM, Ford, and Chrysler products.

The SEA can tell, in either its diagnostic or manual mode, if a problem is in the car's computer engine control system. It can pull trouble codes from the closed-loop On Board Computer (OBC) system as part of its integrated test. Other engine analyzers can't do this, they either run the test separately or not at all. Since the OBC is an integral part of the engine operating system—the engine can't function without it—it should be included in any comprehensive engine test. It doesn't make sense to ignore it or test it separately. Because more cars are using computer-controlled engine systems, this is a much desired feature.

A customer comes to a shop with a driveability complaint. An engine analysis finds some bad plugs and a rich carburetor. The car is tuned and the customer is sent on his way. But if the analyzer can't perform an integrated test with the OBC, it can't detect a computer system's problem and the customer returns to the garage dissatisfied with the "tune-up." An integrated test would have spotted the trouble on the first visit. Net result: a happier customer and no comeback for the shop.

For my brother's 1986 GMC Van, the SEA spit out a list of recommendations longer than a grocery list at a fighter's training camp. It faulted just about every spark plug and plug wire and was critical of the fuel system: "Insufficient fuel control response—Defective sensor connections/sensor wiring to the ECM." It continued, "Your vehicle's computer is not receiving enough information to accurately control performance, fuel economy, and exhaust emissions." (My brother later confirmed that a full tune-up and tightening the loose sensor connection made the van run like new.)

Curious how the computer would respond, I repeated the van's test; but this time I lied and logged in symptoms the van didn't have. The SEA responded to this chicanery by finding the real problems again and then said it couldn't find reasons for the other symptoms but printed out some possibilities.

It couldn't find the cause—and rightly so, for there weren't any problems—but gave me a list of things to check. It was still trying to help. That kind of technology, I soon found, is unique to Allen.

The Cadillac? The SEA said it was fit as a fiddle, a pronouncement confirmed by the quick lube owner who had recently tuned it.

Finding bugs became routine—by day 3, more than 40 bugs on ten different cars were pinpointed and I was more and more taken with the SEA's abilities. I found it was forgiving too. For instance, it checks leads prior to beginning a test and notes if something isn't hooked up properly. If a lead becomes undone during testing, the machine warns you immediately. That's important, because the operator can reconnect and continue. If that happens with other analyzers—and in a shop environment it's a reasonable assumption–the technician has no way of knowing until the analyzer tells him—too late—that the test is invalid and must be redone.

A few weeks later I later saw the value of this when a technician in Arizona forgot to hook up the vacuum lead on another brand of analyzer. He had to run the entire analysis over again, wasting an additional half hour.

When is a Right Answer Wrong? Allen also had on hand a couple of comparable competitive analyzers. It soon was apparent that the SEA usually pinpointed a problem, while the others used a shot gun approach and fired a dizzying array of possibilities at the technician. Worse, these laundry lists often didn't even include some of the actual problems. Common answers such as "valve train problem" or "secondary ignition problem" can leave even an experienced technician groping and shuffling through service manuals for more information.

This dictionary of solutions isn't very helpful—a competent mechanic can guess his way to the secondary ignition without the machine's help. And in trying to pick the right answer, a technician may often choose a wrong one. As Jeff Dircks, Allen's Vice President of Research says, "They give you a shopping list and then ask YOU to choose the answer. Should YOU have to provide the answer? Isn't that what the analyzer is supposed to do?" When is a right answer wrong? When it's vague and partial.

But Can It Spot a Loose Spark Plug Wire? I ran the SEA on an Oldsmobile with the "*Reader's Digest* symptom"—a loose spark plug wire. Its analysis and recommendation was quite different from the Pensecola repair shops. SEA's printout: "Ignition output acceptable. Misfire under load—defective plug/plugwire—Cylinder 5." It didn't waste our time with misleading suggestions but pinpointed the problem. The SEA also said the ignition output was acceptable and adequate voltage was going to the plugs. It found the problem and also told what was right with the system. I think that's important for any technician to know.

The SEA can perform more tests on more cars than any other analyzer. It does complete tests on cars with distributorless ignitions. Other units don't. The SEA operator can do an individual systems test over again, or print out just the segment of the test he is interested in. The "fast" test feature saves the technician time by allowing the machine to bypass information he doesn't need at that time. It also has a real time and digitized scope while others use digitized only.

Just about every car owner has experienced the frustration of a "dead" engine. Allen is the only one to recognize that there are times a car's trouble must be found while the engine is inoperable. If the engine cranks but won't start, the SEA can still analyze a number of the systems including the starting and charging circuits. If the engine won't turn, it can determine if the problem is in the starting circuit. A "dead engine" test, is another SEA exclusive.

After a few days of running a variety of bugged cars on the SEA and competitive analyzers, Allen differences with Bear and Sun units stood out:

- "Smart" testers were expert systems, actually thinking their way through a problem. Others used outdated spec comparison (more on this later).
- The SEA has over 500 diagnostic messages. Others 87 and 102 respectively.
- The SEA pinpointed problems, others gave a "shopping list" or just ignored problems.
- ECM testing is an integrated part of the complete diagnostic procedure.
- Individual systems can be tested separately and there is a "fast" test capacity.
- Machine connections are checked and verified both before and during the test.
- SEA has expandability and compatibility with recently introduced modules.
- It performs all tests on distributorless ignition equipped cars.
- Does "dead" engine tests.
- Performs more tests on more cars.
- Real time and digitized scope patterns.
- Reference to operator's manual page and section.

And not incidentally, Allen claims to have the lowest downtime percentage in the industry.

Jeff Dircks is fond of telling about a technician Allen hired and put through their apprentice training program. After successfully diagnosing many problem vehicles, the technician, flush with success, asked for a raise. He had become an expert in his own eyes. "But," Dircks chuckles, "it was the SEA that deserved the raise because it, and not the mechanic, was solving the problems."

And that's exactly as Allen would have it. "The product will make a good mechanic better," Dircks insists, "and dramatically improve performance of a fair or inexperienced one. That's what we want it to do."

It's not easy for today's automotive technician to keep up. Many don't live near a technical school or have time or money to invest in training. But without proper training, they are soon left behind.

With a quality engine analyzer, he need be less concerned with keeping up, for much of the needed information, including computer-controlled component data, is stored in the analyzer's software.

But what makes the SEA and Smart Scope such excellent evaluators of engine ills? "It's because they are expert systems," explains Jeff Dircks. "Expert system analyzers—and Allen is currently the only manufacturer to have them—are light years ahead of the older spec-comparing models.

When Allen brought out the spec-based 1280 analyzer 20 years ago, it was state-of-the-art technology then. But Smart Scope made existing technology obsolete. Yet the competition continues to use specification comparison as the basis for their products while Allen has moved on to even more high-tech innovations."

Expert Systems. What is an expert system? It's a software package that gives a machine the ability to solve problems by mimicking the way an expert or group of experts would do it. First, the experts gather as much information as possible; then, drawing from that corpus, narrow the possibilities down to the most probable solution. If you think about it, that's how we solve a problem. First, the mind accumulates data, then it logically sifts through the bits and pieces and comes up with a solution.

A Machine That "Thinks" Like We Do. A good diagnostician or mechanic approaches a problem in a logical manner. First he gathers information and then tries to solve his puzzle. If he is still stumped, he will go back, bone up some more, and try again. That's exactly what the SEA does. If at first it doesn't succeed, it backs up, gathers more data and tries again, but at a much higher rate of speed.

An expert system such as Allen's contains the knowledge of many experts. They logged into the system virtually every solution to nearly all engine problems. It's like having a group of expert mechanics diagnose a car. Of course, the precision and thoroughness of an expert system is dependent on the experts' knowledge. Six years of research went into programming the software for the SEA's expert system which is refined and added to yearly.

Other engine analyzers use flow charts or trouble trees (right out of the service manuals) and compare the car's current specs with manufacturer's specifications. Although this works to a limited degree, flow charts can lead the operator to many dead ends (I saw much evidence of this) and limit the analyzer's capabilities.

Although a spec comparing analyzer might be thought of as "logical," the logic is limited. When it enters a branch of a flow chart, it commits itself to going all the way to the end, whether it's on the right track or not, like a leaf caught in a strong river current. Our mind doesn't use flow chart patterns when it thinks, rather, it approaches the problem in a logical, information gathering manner.

Leaping to Conclusions. The SEA is more like the hub in the center of a spoked wheel. Each spoke contains different sets of information and feeds it to the hub on demand. If the desired data is not stored in that spoke, the hub (the processing center) spins from one spoke to another until it finds the answer. This ability to make inferential leaps—it emulates the thinking process of a human being—is the single most important distinguishing factor of a true expert system and is the main reason for the SEA's accuracy. Because comparators lack the data "overlay" capability—the searching through the spokes of the wheel to find the ideal match—of an expert system, their processes are both inefficient and time consuming.

The number of diagnostic messages a system provides is a clue to its thoroughness. The Bear Ace has a total of 87, the Sun MCA, 102. Allen Smart Scope and SEA have over 500! What those numbers mean, in essence, is that the SEA can identify 400+ more problems than its nearest competitor, problems they don't even acknowledge or lump under imprecise all-inclusive answers. To any keen—and not so keen—observer, those numbers carry a convincing message.

Although Allen's competitors claim true diagnostics—the Sun and Bear do have limited diagnostics—Allen's is the only true expert system, a superiority attested to when each is put under the gun.

The engineers at Testproducts love "shoot-outs" with competitive scopes. Different engine analyzers see which can find bugs the fastest and come up with the best percentage of finds. Allen has won every shoot-out it has entered.

Another quandry a spec machine operator may find himself in is that a part may fail to meet the preprogrammed manufacturer's specifications and may be condemned because a related component—not the whole part itself—has failed. This can result in the customer paying for unneeded parts or labor.

After three days of analyzing different cars with you-name-it problems, there was little doubt in my mind that the Smart Scope and SEA were living up to their billings. They were unique products for spotting engine trouble.

"Connections" in All the Right Places. Allen's newest product, the Allen Smart Connection or ASC (pronounced "ask"), is a hand-held diagnostic device with enhanced software that interfaces with the SEA or Smart Scope—it adds a 20 megabite memory—and a car's engine computer. It isolates trouble codes and then pinpoints the problem.

The ASC, also an expert system with true diagnostic ability, differs dramatically from other scan tools because it is the only available product that can track down and pinpoint problems within the trouble code area. It actually trouble shoots the trouble codes.

I ran the ASC on a 1987 Oldsmobiles that showed a GM trouble code 43: Electronic Spark Control (ESC) voltage low. The ASC's diagnosis? "Circuit between ECM terminal L and ESC Module terminal C (ckt 457 yel wire) is open." The ASC found, with uncanny precision, the exact wire, even noting its color, something even the manufacturers don't tell. Allen, aware that the technician in the field would have a difficult time isolating a circuit, logged the color of each wire of each system of each car in the ASC's software, greatly simplifying the diagnosis. The ASC similarly pinpointed problems in the closed loop computer systems of other cars we tested.

Ed Cohen tells of taking the same Oldsmobile with two additional problems into a GM shop. At 9:22 a.m., it was hooked up to CAMS, a GM-built ECM trouble shooter used exclusively by GM dealers. At 9:46, 24 minutes later, it found the broken wire in circuit 457. Over an hour later, at 10:53 a.m., it pronounced that no additional engine faults were found. "But," Cohen chuckles, "when we ran the same car on an SEA/ASC, it found all three problems in 9.4 minutes."

The ASC saves the technician time. Previously, after a scan tool had isolated a trouble code, the technician had to rummage through numerous manuals tracking down the specific problem. The ASC, with its remarkable capability of over 5,000 diagnostic decisions involving many cars, has this information in its software and prints it on the SEA's screen or it can be "hard copied." No manuals are needed. That means time—and money—saved.

I Got a Pal In Kalamazoo. When a shop purchases a "Smart" product, it gets unlimited free product use training, consisting of a 16 hour course on either the Smart Scope or the SEA, at any of 40 training centers throughout the country. Allen is the only manufacturer of engine analyzing equipment that has a continual and centrally-controlled training system with 50 instructors who teach automotive courses and equipment training.

A 36-hour high-tech class on "Modern Underhood Systems Technology" and 16-hour courses on GM, Ford, and Chrysler Products and International Applications of various Bosch fuel injection systems are also offered. In 1987, over 22,000 technicians—many non-Allen users—took advantage of one or more of the courses.

Allen's national toll free 800 repair line is a unique and vital link between owners of their products and the experts in Kalamazoo. If a shop has equipment trouble, it can get immediate help from Allen support staff. Many times that resolves the problem. Maybe they should call it the "I Got a Pal in Kalamazoo" hotline!

If a unit needs repair (Allen shop products have an impressive 98% uptime) one of 134 technicians is dispatched and usually arrives on the scene within 4 hours. The average time to get the unit operational: 12/15 hours. Service feedback from the field goes to the engineering and quality control departments which keep a tight reign on potential problems.

This type of service wasn't apparent in a couple of shops with rival analyzers. One owner complained bitterly that he felt abandoned and received little back-up service and support after the initial sale. In another shop, the technician had been waiting a number of days for repairs.

Quality control and product improvement are ongoing commitments. Each unit undergoes a rigorous predelivery inspection before it is shipped. The purchaser is virtually guaranteed a product that works as it was meant to.

On weekends, Allen's shop bays are crammed with various models and makes as cars are brought in for analyzing as fast as Allen can acquire them to build a body of data and experience of current and future analyzers. Indeed, it seems there isn't an employee—or friend or relative of an employee—at the Testproducts Division that hasn't had his or her car's engine analyzed. I sensed that Allen feels its integrity is on the line with every diagnostic message.

Analyzing Under "Real Life" Conditions. While I was in Michigan, appointments were made to take a bugged car into repair shops, one with a Sun MCA, the other a Bear Ace. When Jim VanLent, Allen's Chief Engineer, and I showed up at the first garage early one morning, we were advised the MCA, only two months old, was not operating.

The second shop, owned by an ASE Master Technician, ran its Bear Ace on our 1987 Oldsmobile with a fuel-injected 3.7 liter V-6 engine. It had two bugs: a leak in the intake manifold just above the number 4 cylinder and the same crushed wire between the ECM and the SEC. VanLent paid an extra $10 to have computer trouble codes run as it was a separate test.

The shop didn't have 87 or 88 specs on hand and had to feed the computer 86 specs for our 87 model. This frustration appears to be a common one.

The analysis took one hour. (An average SEA analysis took 15 to 20 minutes.) Although the Ace did single-out the general vicinity of the vacuum leak it suggested a number of other possibilities that the master mechanic rightly ignored. He ended up relying on instinct and in the end estimated it would cost $150 to replace the intake manifold gasket, something the car did not need. And he refunded the extra $10 VanLent had paid, for he couldn't run trouble codes on an 87 model car. On the same car, the Allen SEA pinpointed both problems quickly.

I found it interesting that this printout's repair recommendations were very similar to the one in Pensacola for the loose spark plug wire.

Even though I had seen much evidence, and in addition had the "Allen Anomalies" of my cross-country trip to confirm Allen's test products "smartness," I opted for more everyday-conditions tests. I took a rented car to three different shops in Arizona: one with a Bear Ace, one an MCA, and the other, an Allen SEA.

After confirming that the rental car (a 1987 Plymouth Reliant with a 2.2 liter fuel-injected engine with 18,800 miles) was in sound condition, I bugged it with a loose alternator belt, a spark plug with a narrow gap, and an unhooked vacuum line.

The results were one-sided: the Allen SEA found all three bugs while the other two found only the bad plug. The Ace erroneously faulted the voltage regulator and primary coil resistance and questioned the basic timing. And when it singled out the suspect sparkplug, it also asked the technician to check the distributor cap terminal and the plug wire, a mini, but superfluous "shopping" list.

The Sun MCA said simply: "Spark plug gap is too small, cylinder number 4." Accurate, but it ignored the other two problems.

While spec comparing analyzers have the ability to spot simple isolated problems, it is my observation that they are easily sidetracked when dealing with multiple symptoms—especially in the same engine system. In one comparative study conducted for Allen by an independent consultant, 50% of the Sun MCA's answers were wrong while the Ace missed the mark 74.9% of the time.

When I talked to the operators of other analyzers it was the same old story: they all were waiting for new software to update the units or they scrambled to excuse the analyzer's lack of accuracy or thoroughness. I wasn't encouraged—and neither would a customer be—that each technician had doubts about the analyzer's ability.

An examination of their current diagnostic messages reveals they are almost identical to the ones in older units. Only the exterior appearance has changed. It's the same technology dressed up in new clothes. As I saw, this ostrich approach ignored many real engine problems.

1500 More Reasons Why—The Firestone Decision. In late 1981 and early 1982, Firestone was in the market for computer engine analyzers for their 1500+ stores. They contacted Allen, Sun, Bear, and FMC, the four main market players at the time, and began an exhaustive study of the companies and their products. It would be the largest single purchase of engine analyzing equipment ever.

Firestone's three main criteria were: 1.) The analyzer should give the technician a specific diagnostic decision rather than a list of choices. 2.) The vendor should be factory direct and not deal through jobbers or distributors. 3.) The product must be viable for a long time and be amenable to future updating and networking.

Two Firestone employees spent 2 weeks at each company's headquarters and an assortment of analyzers were tested in 21 different stores throughout the country. In total, eight months were spent on the project.

James Ison, Firestone's Senior Buyer at the time and one of the two men conducting the survey says, "Allen was heads and shoulders above the others in virtually every area. A prime consideration was Smart Scope's 270 diagnostic decisions (now over 500) compared to a handful for the others. To me this meant less errors from unskilled mechanics and that meant not replacing parts unnecessarily."

Ison notes that with the Smart Scope, "The average time to diagnose an engine was reduced from 40 minutes to 25. And we knew that could be improved on. What's more, comebacks were reduced from 36% to 10%.

Firestone also studied each company's future prospects. "It was clear that the others were not going to make the move to true diagnostics," says Ison. "We calculated that Allen was at least a year ahead in technology at the time and the gap was widening. It was obvious that Allen would continue to be the undisputed leader. In fact, after FMC realized it wouldn't get the sale, it went out of the analyzer business."

All Engine Analyzers Aren't Created Equal. I at one time had the impression—as I'm certain many repair shop owners still do—that all engine analyzers were "about the same." Allen's display of engine diagnostic technology convinced me otherwise. If there's one maxim a shop owner can hang his hat on, it's that all engine analyzers aren't created equal